A 'GLASS TELETYPE' USING THE VZ200

Part 2

Keeping up with the popularity of radioteletype transmission has prompted a few projects from us. Last month we published Part 1 of project 756, designed and developed by Dick Smith's R & D Department to add on an RTTY to the accessible VZ200. This article completes that project and should get you on the airwaves.

IN THE FIRST PART of this article we described the construction of the hardware for your VZ200 RTTY interface. Hopefully by now you have a working RTTY interface plugged into your computer and are rarin' to get on the airwaves and start decoding these dots and dashes. In this part we give the final hookup information and details on using the software as well as a full software listing. Start warming up those transceivers and read on . . .

Now comes the time to connect your transceiver to the interface. Connection is made through the five-pin DIN plug on the rear panel. Wire the TX output and PTT pins to a microphone plug, and the RX input to a speaker plug. You will probably prefer to fit an extension speaker so you can monitor the received signals. Plug the microphone and speaker plugs into your transceiver anbd adjust the receive volume for a comfortable listening level to start with. High receive volume with the mute open on FM, will cause random characters to appear on the screen. This is to be expected if you over-drive the preamp/filters. These high volume levels are not required, and normal operation will require the volume to be no more than normal listening level.

If operating on VHF/UHF, the RTTY signals will probably be FM. This makes things easy, as the received tones will be of the correct frequency. Simply select the channel and adjust the volume. The 'lock detect' LED will light when a signal is being received correctly.

When operating on HF using SSB, care is required in tuning to the correct frequency. The LED will indicate when you are close. If you can't resolve it, try the other sideband.

This RTTY interface is designed to use a shift of 170 Hz. If you wish to receive commercial TTY (many of which use larger shifts), simply tune into one tone only. The 'lock' effect of the XR2211 will ensure correct data reception. Again, if you have difficulty, try the other sideband, the other tone, or another baud rate. NOTE: When receiving commercial, wide-shift TTY, the LED will flash in time with the data, due to the out-of-lock condition on one tone.

The normal specifications for Amateur RTTY are as follows

Mark (logic low)	2125 Hz
Space (logic high)	2295 Hz
Shift	170 Hz
Speed	45.45 baud

Idle: logic high
1 start bit
5 data bits
1.5 stop bits

That concludes the general operation of the RTTY interface. Those Sydney operators who are new to RTTY will find plenty of activity on the Sydney RTTY repeater on 146.675 MHz. There is also a RTTY simplex channel on 146.600 MHz You will find many operators only too glad to encourage newcomers to this mode of communications.

GENERAL OPERATION

Entering your callsign.
On power-up, your VZ200 RTTY interface will introduce itself. To continue, press any key. You will then be asked to enter your callsign. You may enter anything up to 64 characters but it is recommended that if you wish to use the WRU mode, you use the following format:

enter your callsign
VK2FGH (PETER)

There should be no leading space before the callsign and there should be at least one space after the callsign. Apart from that, you may add anything you like up to 64 characters total. This enables your callsign to be used as the WRU code. You may wish to use another code instead. If so, it must not be longer than a normal callsign (i.e: six letters) although it may be shorter, and it must always be followed by a space character. If you press <RETURN> at this point instead of entering text, the callsign buffer will contain a null and any attempt to send a callsign will give no response. The disadvantage of this is that your WRU system (when activated), instead of being selective, will respond to any WRU sent.

Loading the programmable buffers.
Once you have entered your callsign, press <RETURN> and you will enter the buffer entry mode. In this mode, you are able to enter text into any of the six programmable buffers. Each buffer may contain up to 64 characters. You may start entering text by typing the number of the buffer you require. Your VZ200 will display the buffer number you have selected. Simply enter your text as you require.

Note: the SHIFT M command is used for the backspace key.

Press <RETURN> when you are finished, and your buffer is programmed. Repeat the process for each buffer you require to program, including the WRU buffer (buffer 0). When you have finished, press SHIFT X to enter the MENU.

Menu mode.
From the MENU you are able to enter the three main operation modes, i.e: receive mode, transmit mode, and buffer entry mode. You can return to the menu at any time from any of these modes by using SHIFT X.

Receive mode.
In this mode you are able to receive RTTY. The first thing you will notice is the command line at the top of the screen. This line tells you the current status of the system. In the RECEIVE mode it will display RECEIVE MODE on the left. On the right will be the number 45. This is the current BAUD rate. The system will always default to 45.45 baud.

The command line is also used to display the current status of the PRINTER and WRU modes. These modes always default to the OFF status.

To demonstrate this, hold down the ▶

PROGRAM LISTING

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ADDR   0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F

4000: AA 55 E7 18 21 FF 7F F9 F3 3E 0D 21 09 80 77 11
4010: 0A 80 01 80 01 ED B0 3E EC 32 08 80 AF 32 06 80
4020: 32 07 80 CD EF 49 CD D9 49 CD C9 01 21 F7 43 CD
4030: A7 28 CD 20 47 FE 00 28 F9 CD C9 01 21 AC 44 CD
4040: A7 28 21 8F 81 C3 2E 46 CD DA 41 CD C9 01 AF 32
4050: 00 60 21 F6 81 22 F4 81 77 11 F7 81 01 01 04 ED
4060: B0 CD CA 46 32 F2 81 21 60 42 CD A3 45 21 90 42
4070: CD A7 28 21 D6 42 CD A7 28 21 09 43 CD A7 28 CD
4080: F4 2E FE 31 CA 93 40 FE 32 CA 1F 48 FE 33 CA B5
4090: 45 18 EC AF 32 00 60 CD C9 01 21 1E 42 CD A3 45
40A0: CD 77 46 CD D9 49 CD EF 49 21 C0 71 22 00 80 21
40B0: E0 70 22 F0 81 CD 70 4B AF 32 05 80 CD 23 49 3A
40C0: 05 80 FE FF CA 28 48 CD 8F 46 1E 00 3A 00 50 CB
40D0: 7F 28 E9 CD 23 49 3A 05 80 FE FF CA 28 48 CD 8F
40E0: 46 3A 00 50 CB 7F 20 EB 0E 08 CD 1E 45 CD 18 45
40F0: 3A 00 50 CB 17 CB 11 38 05 CD 18 45 18 F2 CD 18
4100: 45 21 E0 46 06 00 16 00 79 FE 1B 20 02 1E 01 FE
4110: 1F 20 02 1E 00 CB 21 19 09 7E FE 09 FA 2E 41 FE
4120: 0D 20 02 1E 00 CD 68 45 CD 30 41 CD 5B 41 18 A3
4130: E5 D5 F5 3A 07 80 FE 00 28 1D 37 3F ED 5B F8 85
4140: 21 38 86 ED 52 28 10 F1 FE 0C 38 08 2A F8 85 77
4150: 23 22 F8 85 D1 E1 C9 F1 D1 E1 C9 F5 D5 F5 3A 06
4160: 80 FE 00 20 03 F1 18 2F 21 D0 81 11 DA 81 01 0A
4170: 00 ED B0 21 DA 81 11 D1 81 01 09 00 ED B0 11 D0
4180: 81 F1 12 21 E4 81 11 D9 81 1A BE 20 0A 23 1B 7E
4190: FE AA 28 06 1A 18 F3 D1 F1 C9 D1 F1 21 0C 42 ED
41A0: 5B F4 81 01 06 00 ED B0 ED 53 F4 81 3E 06 32 F2
41B0: 81 CD F6 41 3E 0D CD 30 41 3A 00 50 CB 7F 20 F9
41C0: 0E 32 CD 1E 45 CD 18 45 3A 00 50 CB 7F 20 EA 0D
41D0: 20 F3 3A 05 80 2F 32 05 80 C9 21 8F 81 11 E4 81
41E0: 7E 12 FE 20 23 13 28 02 18 F6 06 04 21 FC 44 7E
41F0: 12 23 13 10 FA C9 06 0C 21 7F 00 C5 01 64 00 CD
4200: 5C 34 01 00 20 CD 60 00 C1 10 ED C9 95 0D 0D 90
4210: 0D 23 57 52 55 00 20 20 20 00 50 52 54 00 52 45
4220: 43 45 49 56 45 20 4D 4F 44 45 20 20 20 20 20 20
4230: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00 54
4240: 52 41 4E 53 4D 49 54 20 4D 4F 44 45 20 20 20 20
4250: 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 00
4260: 20 20 20 20 20 20 20 20 20 56 5A 2D 32 30 30 20
4270: 20 52 54 54 59 20 20 20 20 20 20 20 20 20 00 00
4280: 34 35 20 00 35 30 20 00 37 35 20 00 31 31 30 00
4290: 0D 0D 0D 20 20 20 20 20 20 20 20 20 20 20 20 20
42A0: 4D 45 4E 55 0D 0D 20 20 20 31 29 20 52 45 43 45
42B0: 49 56 45 20 20 20 32 29 20 54 52 41 4E 53 4D 49
42C0: 54 0D 20 20 20 33 29 20 4C 4F 41 44 20 42 55 46
42D0: 46 45 52 53 0D 00 0D 20 20 50 52 45 53 53 20 D3
42E0: C8 C9 C6 D4 20 D8 20 41 54 20 41 4E 59 20 54 49
42F0: 4D 45 0D 20 20 20 20 20 20 20 20 20 20 46 4F
4300: 52 20 4D 45 4E 55 0D 0D 00 0D 20 20 20 20 20 20
4310: 20 20 20 53 45 4C 45 43 54 20 28 31 2D 33 29 0D
4320: 00 0D 0D 20 20 20 20 20 20 42 55 46 46 45 52 20
4330: 49 4E 50 55 54 20 52 4F 55 54 49 4E 45 0D 0D 0D
4340: 0D 0D 20 20 45 4E 54 45 52 20 42 55 46 46 45 52
4350: 20 4E 55 4D 42 45 52 20 28 30 2D 35 29 00 20 57
4360: 52 55 20 42 55 46 46 45 52 0D 00 20 42 55 46 46
4370: 45 52 20 23 31 0D 00 20 42 55 46 46 45 52 20 23
4380: 32 0D 00 20 42 55 46 46 45 52 20 23 33 0D 00 20
4390: 42 55 46 46 45 52 20 23 34 0D 00 20 42 55 46 46
43A0: 45 52 20 23 35 0D 00 44 45 20 0D 43 51 20 43 51
43B0: 20 43 51 20 43 51 20 43 51 20 43 51 20 43 51 20
43C0: 43 51 20 43 51 20 43 51 20 0D 20 50 4C 53 20 4B
43D0: 4B 20 4B 4B 20 4B 4B 0D 52 59 52 59 52 59 52 59
43E0: 52 59 52 59 52 59 52 59 52 59 52 59 52 59 52 59
43F0: 52 59 52 59 52 59 0D 0D 0D 20 20 20 20 20 20 20
4400: 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A
4410: 2A 2A 0D 20 20 20 20 20 20 20 2A 20 20 56 5A 2D
4420: 32 30 30 20 20 52 54 54 59 20 20 2A 0D 20 20 20
4430: 20 20 20 20 2A 20 54 45 52 4D 49 4E 41 4C 20 20
4440: 50 41 43 4B 20 2A 0D 20 20 20 20 20 20 20 2A 2A
4450: 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A 2A
4460: 0D 0D 20 20 20 20 20 20 20 20 20 20 20 20 20 20
4470: 46 52 4F 4D 0D 20 20 20 20 20 44 49 43 4B 20 53
4480: 4D 49 54 48 20 45 4C 45 43 54 52 4F 4E 49 43 53
4490: 0D 20 20 20 20 20 20 20 43 4F 50 59 52 49 47 48
44A0: 54 20 28 43 29 20 31 39 38 34 0D 00 0D 45 4E 54
44B0: 45 52 20 59 4F 55 52 20 43 41 4C 4C 53 49 47 4E
44C0: 20 3A 0D 00 54 48 45 20 51 55 49 43 4B 20 42 52
44D0: 4F 57 4E 20 46 4F 58 20 4A 55 4D 50 53 20 4F 56
44E0: 45 52 20 54 48 45 20 4C 41 5A 59 20 44 4F 47 20
44F0: 30 31 32 33 34 35 36 37 38 39 20 0D 57 52 55 AA
4500: 53 54 41 54 49 4F 4E 20 49 44 45 4E 54 49 46 49
4510: 43 41 54 49 4F 4E 20 0D CD 1E 45 CD 23 49 C5 3A
4520: 08 80 06 0B 10 FE 3D 20 F9 C1 C9 2A 00 80 FE 0D
4530: 28 05 FE 20 30 23 C9 ED 5B 20 78 D5 22 20 78 3E

4540: 0D 21 02 80 BE 28 06 CD 3A 03 32 02 80 2A 20 78
4550: 22 00 80 D1 ED 53 20 78 C9 FE 40 38 02 D6 40 77
4560: 32 02 80 23 22 00 80 C9 E5 D5 C5 F5 CD 2B 45 7C
4570: FE 71 28 02 18 06 7D FE E0 D4 81 45 F1 C1 D1 E1
4580: C9 F5 21 40 71 11 20 71 01 A0 00 ED B0 21 C0 71
4590: 3E 20 77 11 C1 71 01 20 00 ED B0 21 C0 71 22 00
45A0: 80 F1 C9 11 00 70 7E FE 00 C8 FE 40 30 02 C6 40
45B0: 12 23 13 18 F1 CD C9 01 21 21 43 CD A7 28 21 D6
45C0: 42 CD A7 28 CD 63 4B CD 20 47 CD 79 4B FE 01 CA
45D0: 48 40 FE 30 28 16 FE 31 28 1D FE 32 28 24 FE 33
45E0: 28 2B FE 34 28 32 FE 35 28 39 18 DB 21 5E 43 CD
45F0: A7 28 21 09 80 18 37 21 6B 43 CD A7 28 21 4A 80
4600: 18 2C 21 77 43 CD A7 28 21 8B 80 18 21 21 83 43
4610: CD A7 28 21 CC 80 18 16 21 8F 43 CD A7 28 21 0D
4620: 81 18 0B 21 9B 43 CD A7 28 21 4E 81 18 00 06 40
4630: CD 70 4B E5 C5 CD 20 47 C1 FE 01 28 36 FE 00 28
4640: F3 FE 08 E1 28 12 77 FE 0D CA B5 45 23 CD 3A 03
4650: CD 70 4B 10 DE C3 B5 45 78 FE 40 28 D1 3E 08 CD
4660: 3A 03 3E 20 CD 3A 03 3E 08 CD 3A 03 04 2B CD 70
4670: 4B 18 C0 E1 C3 48 40 3A 08 80 FE EC CA 65 4C FE
4680: D7 CA 47 4C FE 8D CA 51 4C FE 61 CA 5B 4C C9 F5
4690: C5 E5 D5 CD C4 05 CB 47 20 18 3A FA 85 FE 00 28
46A0: 11 CD DB 46 FE 0D 20 07 3E 0A 32 FA 85 18 E4 CD
46B0: B7 46 D1 E1 C1 F1 C9 11 FA 85 21 FB 85 01 40 00
46C0: ED B0 2A F8 85 2B 22 F8 85 C9 AF 21 FA 85 22 F8
46D0: 85 77 11 FB 85 01 40 00 ED B0 C9 D3 0E D3 0D C9
46E0: 05 05 54 35 0D 0D 4F 39 20 20 48 00 4E 2C 4D 2E
46F0: 00 00 4C 29 52 34 47 24 49 38 50 30 43 3A 56 3D
4700: 45 33 5A 2B 44 00 42 3F 53 27 59 36 46 25 58 2F
4710: 41 2D 57 32 4A 27 04 04 55 37 51 31 4B 28 07 07
4720: 21 FE 68 0E 08 06 06 7E F6 04 1F 30 4F 10 FB CB
4730: 05 0D 20 F1 06 04 21 DF 68 7E CB 57 28 23 CB 05
4740: 7E CB 57 28 20 CB 05 7E CB 57 28 1D CB 05 CB 05
4750: CB 05 7E CB 57 28 16 3E FF 32 04 80 AF 32 03 80
4760: C9 0E 03 18 17 0E 02 18 13 0E 01 18 0F 3A 03 80
4770: CB CF 32 03 80 3E FF 32 04 80 AF C9 21 B0 47 1E
4780: 00 3A 03 80 CB 4F 28 02 1E 30 3E 08 91 4F 3E 06
4790: 90 47 CD A3 47 83 06 00 4F 09 7E 21 04 80 BE 28
47A0: D9 77 C9 AF B9 28 07 C6 06 0D 28 02 18 F9 80 C9
47B0: 54 57 20 45 51 52 47 53 20 44 41 46 42 58 20 43
47C0: 5A 56 35 32 20 33 31 34 4E 2E 20 2C 20 4D 36 39
47D0: 2D 38 30 37 59 4F 0D 49 50 55 48 4C 3A 4B 3B 4A
47E0: 75 72 00 73 71 74 85 87 00 84 89 8F 83 01 00 81
47F0: 0A 00 25 22 20 23 21 24 00 00 00 00 00 08 26 29
4800: 3D 28 90 27 00 82 91 95 88 94 86 3F 00 2F 2B 00
4810: 21 20 71 3E 20 77 11 21 71 01 C0 00 ED B0 C9 CD
4820: C9 01 21 E0 70 22 F0 81 CD 10 48 3E FF 32 05 80
4830: AF 32 EF 81 21 3F 42 CD A3 45 CD 77 46 CD D9 49
4840: CD EF 49 21 C0 71 22 00 80 CD 70 4B 3E FF 32 00
4850: 60 06 96 CD 18 45 10 FB CD 23 49 3A 05 80 FE 00
4860: CC C6 48 CD 8F 46 CD 10 4A FE 00 28 EB FE 71 CA
4870: CD 4B FE 72 CA D7 4B FE 73 CA E1 4B FE 74 CA EB
4880: 4B FE 75 CA F5 4B FE 81 CA 84 4B FE 82 CA 9B 4B
4890: FE 84 CA 94 4B FE 88 CA A5 4B FE 89 CA AF 4B FE
48A0: 8F CA B9 4B FE 90 CA C3 4B FE 95 CA 8D 4B FE 23
48B0: CA CE 48 CD 30 41 CD D4 48 CD 68 45 FE 0D CA 3E
48C0: 4B CD B7 4A 18 92 21 F6 81 7E FE 00 C0 F1 CD 63
48D0: 4B C3 93 40 F5 F5 FE 0D 28 1A FE 20 28 0E 3A EF
48E0: 81 FE 3E 28 0F 3C 32 EF 81 F1 F1 C9 3A EF 81 FE
48F0: 39 DA E5 48 AF 32 EF 81 F1 FE 0D 28 ED FE 20 28
4900: 08 3E 2D CD 68 45 CD B7 4A CD 5E 4B CD 59 4B 3E
4910: 0D CD 68 45 F1 FE 20 28 08 F5 3E 01 32 EF 81 F1
4920: C9 AF C9 D5 C5 CD 20 47 FE 00 28 66 FE 01 28 68
4930: FE 0A CA B7 49 FE 87 CA 9E 49 FE 83 28 66 FE 86
4940: CA CD 49 FE 94 CA C1 49 FE 85 28 5D FE 91 28 5F
4950: CD 3F 4A F5 E5 C5 FE 08 20 16 2A F2 81 7C B5 CA
4960: 03 4A 2B 22 F2 81 2A F4 81 2B AF 77 3E 08 18 1C
4970: F5 ED 4B F2 81 21 FC 03 ED 42 7C B5 CA 0D 4A 2A
4980: F2 81 23 22 F2 81 F1 2A F4 81 77 23 22 F4 81 C1
4990: E1 F1 C1 D1 CD 70 4A C9 C1 D1 F1 C3 48 40 CD 17
49A0: 4C C1 D1 C9 CD CA 46 18 F8 C1 D1 F1 C3 39 40 3E
49B0: 0D 2A F8 85 77 18 EA C1 D1 3A 05 80 2F 32 05 80
49C0: C9 3A 06 80 2F 32 06 80 CD D9 49 18 D4 3A 07 80
49D0: 2F 32 07 80 CD EF 49 18 C8 3A 06 80 FE 00 20 05
49E0: 21 16 42 18 03 21 12 42 11 10 70 CD A6 45 C9 3A
49F0: 07 80 FE 00 20 05 21 16 42 18 03 21 1A 42 11 15
4A00: 70 18 E8 C1 E1 F1 C1 D1 AF CD 70 4A C9 F1 18 F3
4A10: 2A F2 81 7C B5 C8 2B 22 F2 81 21 F6 81 7E FE 00
4A20: C8 F5 21 F7 81 01 00 04 09 AF 77 21 F7 81 11 F6
4A30: 81 01 00 04 ED B0 2A F4 81 2B 22 F4 81 F1 C9 E5
4A40: C5 D5 F5 2A F0 81 7D FE 3F D2 6B 4A 21 60 70 11
4A50: 40 70 01 A0 00 ED B0 21 E0 70 3E 20 77 11 E1 70
4A60: 01 20 00 ED B0 21 E0 70 22 F0 81 F1 D1 C1 E1 C9
4A70: FE 08 28 25 FE 0D 28 05 FE 20 30 28 C9 ED 5B 20
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4A80:  78 D5 2A F0  81 22 20 78  3E 0D CD 3A  03 2A 20 78
4A90:  22 F0 81 D1  ED 53 20 78  C9 2A F0 81  3E 20 2B 77
4AA0:  22 F0 81 C9  FE 40 38 06  FE 60 30 02  D6 40 2A F0
4AB0:  81 77 23 22  F0 81 C9 D6  0A FE 03 CA  5E 4B D6 13
4AC0:  FE 40 D0 FE  03 CA D8 4A  FE 21 D2 D8  4A 08 FE FF
4AD0:  28 10 3E FF  08 C3 33 4B  08 FE 00 28  05 AF 08 C3
4AE0:  28 4B 08 CD  E7 4A C9 21  76 4C 01 00  00 4F 09 4E
4AF0:  06 06 CB 11  CB 11 CB 11  DA 07 4B C3  12 4B 10 F6
4B00:  CD 1C 4B CD  8F 46 C9 3E  FF 32 00 58  CD 18 45 C3
4B10:  FE 4A AF 32  00 58 CD 18  45 C3 FE 4A  3E FF 32 00
4B20:  58 CD 18 45  CD 1E 45 C9  F5 0E 1F CD  F0 4A F1 CD
4B30:  E7 4A C9 F5  0E 1B CD F0  4A F1 CD E7  4A C9 0E 02
4B40:  CD F0 4A C3  46 4B 0E 08  CD F0 4A C3  58 48 0E 04
4B50:  CD F0 4A 08  AF 08 C3 58  48 0E 08 C3  F0 4A 0E 02
4B60:  C3 F0 4A 01  FF BF CD 60  00 01 FF BF  CD 60 00 C9
4B70:  C5 01 FF 5F  CD 60 00 C1  C9 F5 C5 01  FF 2F CD 60
4B80:  00 C1 F1 C9  FD 21 AB 43  CD FF 4B 18  07 FD 21 00
4B90:  45 CD FF 4B  FD 21 A7 43  CD FF 4B FD  21 8F 81 CD
4BA0:  FF 4B C3 58  48 FD 21 CA  43 CD FF 4B  C3 58 48 FD
4BB0:  21 D8 43 CD  FF 4B C3 58  48 FD 21 C4  44 CD FF 4B
4BC0:  C3 58 48 FD  21 09 80 CD  FF 4B C3 58  48 FD 21 4A
4BD0:  80 CD FF 4B  C3 58 48 FD  21 8B 80 CD  FF 4B C3 58
4BE0:  48 FD 21 CC  80 CD FF 4B  C3 58 48 FD  21 0D 81 CD
4BF0:  FF 4B C3 58  48 FD 21 4E  81 CD FF 4B  C3 58 48 FD
4C00:  7E 00 FE 0D  C8 F5 CD 68  45 CD 30 41  CD 8F 46 CD
4C10:  B7 4A F1 FD  23 18 E8 3A  08 80 FE EC  28 0D FE D7
4C20:  28 10 FE 8D  28 13 FE 61  28 16 C9 3E  D7 32 08 80
4C30:  18 15 3E 8D  32 08 80 18  18 3E 61 32  08 80 18 1B
4C40:  3E EC 32 08  80 18 1E 11  1B 70 21 84  42 CD A6 45
4C50:  C9 11 1B 70  21 88 42 CD  A6 45 C9 11  1B 70 21 8C
4C60:  42 CD A6 45  C9 11 1B 70  21 80 42 CD  A6 45 C9 01
4C70:  FF FF CD 60  00 C9 08 02  00 04 00 00  00 0B 16 00
4C80:  1A 1E 09 00  11 06 18 07  17 0D 1D 19  10 0A 01 15
4C90:  1C 0C 03 0E  00 00 0F 00  13 00 18 13  0E 12 10 16
4CA0:  0B 05 0C 1A  1E 09 07 06  03 0D 1D 0A  14 01 1C 0F
4CB0:  19 17 15 11  FF 04 FF 04  FF 4C FF 4C  FF 4C FF 4C
4CC0:  FB 48 FB 48  FB 48 FB 08  FB 08 FB 00  FB 00 FB 00
4CD0:  FB 48 FB 08  FB 08 FB 08  FB 00 FB 00  FB 00 FB 00
4CE0:  FB 48 FB 48  FB 48 FB 08  FB 00 FB 00  FB 00 FB 00
4CF0:  FB 48 FB 08  FB 08 FB 08  FB 00 FB 00  FB 00 FB 00
4D00:  37 00 FF 04  FF 04 FF 04  FF 0C FF 0C  FF 0C FF 0C
4D10:  FF 04 FF 04  FF 04 FF 04  FF 0C FF 0C  FF 0C FF 0C
4D20:  FF 04 FF 04  FF 04 FF 04  FF 0C FF 0C  FF 0C FF 0C
4D30:  FF 04 FF 04  FF 04 FF 04  FF 0C FF 0C  FF 0C FF 0C
4D40:  FB 08 FB 08  FB 08 FB 08  FB 00 FB 00  FB 00 FB 00
4D50:  FB 08 FB 08  FB 08 FB 08  FB 00 FB 00  FB 00 FB 00
4D60:  FB 08 FB 08  FB 08 FB 08  FB 00 FB 00  FB 00 FB 00
4D70:  FB 08 FB 08  FB 08 FB 00  FB 00 FB 00  FB 00 FB 00
4D80:  37 0C FF 0C  FF 0C FF 0C  FF 4C FF 0C  FF 4C FF 0C
4D90:  FF 0C FF 04  FF 04 FF 04  FF 4C FF 4C  FF 4C FF 0C
4DA0:  FF 0C FF 0C  FF 0C FF 0C  FF 4C FF 0C  FF 4C FF 0C
4DB0:  FF 0C FF 04  FF 0C FF 04  FF 4C FF 0C  FF 4C FF 4C
4DC0:  FB 48 FB 08  FB 48 FB 08  FB 08 FB 08  FB 08 FB 08
4DD0:  FB 08 FB 08  FB 08 FB 08  FB 08 FB 08  FB 08 FB 08
4DE0:  FB 48 FB 08  FB 48 FB 08  FB 08 FB 08  FB 08 FB 08
4DF0:  FB 08 FB 08  FB 08 FB 08  FB 08 FB 08  FB 08 FB 08
4E00:  37 0C FF 0C  FF 0C FF 04  FF 0C FF 0C  FF 04 FF 04
4E10:  FF 04 FF 04  FF 04 FF 04  FF 0C FF 0C  FF 0C FF 04
4E20:  FF 0C FF 04  FF 0C FF 0C  FF 0C FF 04  FF 0C FF 04
4E30:  FF 04 FF 04  FF 04 FF 04  FF 0C FF 04  FF 0C FF 0C
4E40:  FB 08 FB 08  FB 08 FB 00  FB 08 FB 08  FB 08 FB 08
4E50:  FB 08 FB 00  FB 08 FB 00  FB 08 FB 08  FB 08 FB 08
4E60:  FB 08 FB 08  FB 08 FB 00  FB 08 FB 08  FB 08 FB 08
4E70:  FB 08 FB 08  FB 00 FB 00  FB 08 FB 08  FB 08 FB 08
4E80:  17 0C FF 0C  FF 04 FF 04  FF 0C FF 04  FF 04 FF 04
4E90:  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04
4EA0:  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04
4EB0:  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04
4EC0:  FB 08 FB 00  FB 00 FB 00  FB 08 FB 08  FB 08 FB 08
4ED0:  FB 08 FB 00  FB 00 FB 00  FB 08 FB 08  FB 08 FB 00
4EE0:  FB 00 FB 00  FB 00 FB 00  FB 08 FB 08  FB 08 FB 08
4EF0:  FB 00 FB 00  FB 00 FB 00  FB 08 FB 00  FB 00 FB 08
4F00:  37 04 FF 04  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04
4F10:  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04
4F20:  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04
4F30:  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04
4F40:  FB 00 FB 00  FB 00 FB 00  FB 00 FB 00  FB 00 FB 00
4F50:  FB 00 FB 00  FB 00 FB 00  FB 00 FB 00  FB 00 FB 00
4F60:  FB 00 FB 00  FB 00 FB 00  FB 00 FB 00  FB 00 FB 00
4F70:  FB 00 FB 00  FB 00 FB 00  FB 00 FB 00  FB 00 FB 00
4F80:  37 0C FF 0C  FF 0C FF 04  FF 0C FF 04  FF 04 FF 04
4F90:  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04
4FA0:  FF 0C FF 04  FF 04 FF 04  FF 04 FF 04  FF 04 FF 04
4FB0:  52 4F 4D 20  43 4F 4E 54  45 4E 54 53  20 43 4F 50
4FC0:  59 52 49 47  48 54 20 28  43 29 20 31  39 38 34 20
4FD0:  44 49 43 4B  20 53 4D 49  54 48 20 45  4C 45 43 54
4FE0:  52 4F 4E 49  43 53 20 50  54 59 2E 20  4C 54 44 2E
4FF0:  20 41 55 53  54 52 41 4C  49 41 2E 00  00 00 00 00
```

NOTES & ERRATA

Nov '84, project 756, p 106: On page 107, last column, note that there are **nine** links on the decoder board, not eight. On the circuit diagram, page 109, C23 should read 470n; the Parts List is correct. On page 110, in the table under "Immediate Commands", the second command is SHIFT X. In the text on page 110, second last paragraph, the last sentence should read: "See that the two polarised capacitors (C21 and C22) are correctly oriented." Note that R7 is actually 2k7, as per the Parts List, not 4k7, as per the circuit.

THE SOFTWARE

There is an unused section in the VZ200 memory map between 4000H and 67FFH. This area was set aside for use with plug-in software packs. The RTTY unit fits into this area of memory.

For design simplicity, this section is decoded into five 2K blocks. The first two blocks are used for the main software routines. The other three blocks are used for receive data, transmit data and relay data.

All data transfer is done through bit 7 (D7). The software also uses a section of RAM starting at 8000H. This area is used to store volatile data such as buffers and flags.

Some useful RAM and EPROM addresses are given below.

RAM LOCATIONS

8000/01	Receive character cursor position
8005	Receive/transmit toggle flag
8006	WRU flag
8007	Printer flag
8008	Timing loop value (231 = 45.45 baud)
8009	Start of buffer 0
804A	Start of buffer 1
808B	Start of buffer 2
80CC	Start of buffer 3
810D	Start of buffer 4
814E	Start of buffer 5
818F	Start of callsign storage area
81F0/F1	Transmit cursor position
81F6	Start of keyboard input buffer

EPROM LOCATIONS

4000	EPROM entry point
4039	Callsign entry routine
45B5	Buffer entry routine
4048	Menu entry point
4093	Receive routine entry point
468F	Line printer routine entry point
4518	Delay routine
4923	Keyboard input and video processing routine
4810	Transmit entry point
484C	Transmit active point
4568	Transmit data video display routine
4AB7	ASCII to baud conversion
49B7	Toggle receive/transmit relay on/off
49C1	Toggle WRU on/off
49CD	Toggle printer on/off
499E	Change baud rate 45-50-75-110-45 etc.

OTHERS

5000	Receive data
5800	Transmit data
6000	Transmit/receive relay

MODIFICATIONS TO VZ/RTTY DECODER TO IMPROVE PERFORMANCE ON WIDEBAND COMMERCIAL RTTY

The following changes to component values will allow less critical receiver tuning when decoding wideband commercial RTTY found on the HF bands.

While values are given for both 425 Hz and 850 Hz shifts, prototype units constructed for 850 Hz shift use were quite capable of resolving stations using 425 Hz shifts.

It should be noted that once these modifications have been performed, it is highly unlikely that the decoder will resovle 170 Hz shift amateur RTTY.

CHANGES FOR 850 Hz SHIFT (1450/2300 Hz)

I) Changes to filter stages

Change:

R35	from	300k 5%	to	180k 5%
R34	from	27k 5%	to	27k 1%
R33	from	3k9 1%	to	27k 1%
R32	from	680k 1%	to	1M 1%
R31	from	680k 1%	to	18k 5%
R19	from	390k 5%	to	100k 5%
R18	from	220k 5%	to	470k 5%
R17	from	3k9 1%	to	8k2 1%
R16	from	1M 1%	to	47k 5%

R15 no change.

II) Changes to FSK decoder

Change:

RV2	from	10k	to	20k
R14	from	18k 1%	to	15k 1%
R12	from	270k 5%	to	47k 5%
R11	from	470k 5%	to	1M5 5%
C7	from	330n	to	39n

CHANGES FOR 425Hz SHIFT (1875/2300Hz)

I) Changes to filter stages

Change:

R35	from	330k 5%	to	220k 5%
R34	from	27k 5%	to	39k 1%
R33	from	3k9 1%	to	12k 1%
R32	from	680k 1%	to	820k 1%
R31	from	680k 1%	to	68k 1%
R19	from	390k 5%	to	150k 5%
R18	from	220k 5%	to	47k 5%
R17	from	3k9 1%	to	8k2 1%
R16	from	1M 1%	to	100k 1%

R15 no change

II) Changes to FSK decoder

Change:

RV2	from	10k	to	20k
R14	from	18k 1%	to	12k 1%
R12	from	270k 5%	to	100k 5%
R11	from	470k 5%	to	1M5 5%
C7	from	330n	to	39n

SHIFT key and press U. The command line will display WRU. This indicates that the WRU mode is now active. Again press SHIFT U, and the WRU will no longer be displayed, indicating the WRU mode is disabled. Try the same with SHIFT H. This enables and disables the printer. Similarly, SHIFT 5 changes the BAUD rate.

The screen is split into two sections, each with independent scrolling. All received text is displayed on the bottom screen, while the top screen is used to display your typed text. You may type and receive simultaneously. The type ahead buffer can contain up to 1024 (1K) characters. Any data from the buffers may be added as you go by pressing the appropriate enable keys. A graphic block will be displayed as you type to show you that a buffer has been enabled. You may terminate your text with the '#' code. When this code is found during transmission, your system will automatically revert to the receive mode.

Transmit mode.

When the station you are communicating with has finished his transmission, you may reply to him by pressing

SHIFT Z

This sends your terminal to the transmit mode, enabling your transmitter, and sending the test you previously typed. You may continue typing if you wish. Your system will continue to send the stored text, including any programmed text, until it catches up with your typing, whereby it will follow the text as you type it. During all this time, the text is displayed on the bottom screen, along with the contents of any programmed buffers you may have enabled. Thus you can see everything being sent in its final form. You may exit to receive by using either

#
or
SHIFT Z

Note: SHIFT Z will not work if there is still data in the buffer waiting to be sent. This prevents you from accidentally terminating the transmission prematurely. If you wish to abort your transmission intentionally, use

SHIFT X

to get back to the menu.

WRU mode.

The WRU mode is a special feature included to add versatility to your system. To activate this mode, press

SHIFT U

The letters WRU will appear on the command line. When this mode is active, any station sending your callsign (or any other code entered on power-up), followed by the letters WRU, will activate your system. When this happens, your VZ200 will first Beep to let you know that your system is being called. After checking to ensure the frequency is clear, your transmitter will then activate automatically, sending 'STATION IDENTIFICATION DE < callsign>', along with any message stored in the WRU buffer (buffer # 0).

For example, if you had entered on power-up 'VK2FGH (PETER)' any station wishing to activate your WRU mode would need to send

VK2FGH WRU

Your system would then respond with

STATION IDENTIFICATION DE
VK2FGH (PETER)

If you had programmed the WRU buffer, your system might also add

PLEASE STAND BY . . .
++ OPERATOR ALERTED ++

or something similar.

If you wished to leave a special message your could put any code up to six letters long (followed by a space, of course) in the callsign storage buffer, and the special message in the WRU buffer. Only the stations aware of your code will be able to access the message.

Inbuilt pre-programmed buffers.

There are seven pre-programmed messages stored in your VZ200 terminal. Many of these are designed to insert your callsign automatically when called, to save you time and effort. These buffers and their enable commands are listed below:

Note: one row of text here is 32 characters. Thus it will only fill one half of a normal 64 character screen.

SHIFT C: Send — CQ
One row of CQs is sent along with your callsign

SHIFT A: Send — RYs
One row of RYs is sent.

SHIFT F: Send — QBF
Send 'THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 0123456789'

SHIFT P: Send — over terminator.
The message 'PLEASE KK KK KK' is sent to terminate your call.

SHIFT I: Identify your station.
The message 'STATION IDENTIFICATION DE (callsign)' is sent. This is the same as is sent by the WRU mode.

SHIFT O: Send — Callsign.
Your callsign (as entered on power-up) is sent.

SHIFT D: Send — DE callsign.
As above except 'DE' is added to the start of your callsign.

Following are the commands to send the programmable buffers.

SHIFT Q: Send buffer #1

SHIFT W: Send buffer #2

SHIFT E: Send buffer #3

SHIFT R: Send buffer #4

SHIFT T: Send buffer #5

SHIFT 0: Send WRU buffer (buffer #0)

At any time you may require to restart the system. This is useful if you wish to re-enter your callsign, or enter your own WRU code. To do this, type

SHIFT G

This exits the current mode and restarts at the callsign entry mode. You may now re-enter your callsign.

Printer Function.
Your VZ200 will also drive a line printer. You may enable or disable the printer mode using

SHIFT H

Once enabled, all text received or transmitted will be sent to the printer to be stored as 'hard copy'. Note: If you enable the printer but do not have a printer on-line, your system will not be affected and will ignore the enable mode. *But*, text will still be stored in the internal printer buffer until the buffer finally fills up.

The internal print buffer is only 64 characters long and is designed to hold characters only when the printer is busy printing. Because of this, any text received when the printer is not on-line but the print routine is enabled, will be truncated in the buffer. If you have the print mode enabled and don't want to print the text which has been stored in the internal print buffer, you may clear the buffer with the following command

SHIFT B

There will be times when a station does not terminate his contact with a CARRIAGE RETURN (CR). When this happens, you may find the last line of text does not get printed on the line printer. This is because many printers wait for a CR before printing the next line of text. By using the command

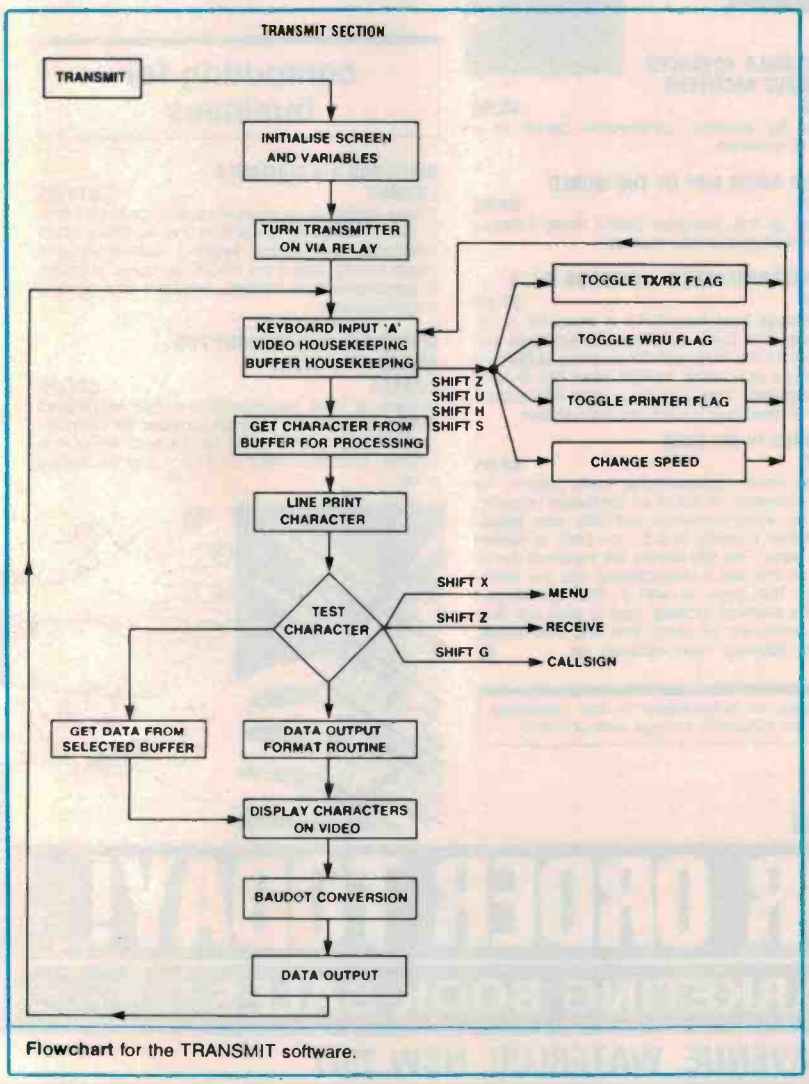
SHIFT <RETURN>

a carriage return will be inserted into the print buffer, thereby forcing it to print the last line. This can be done at any time to clear the printer's buffer, by forcing it to dump its contents onto paper.

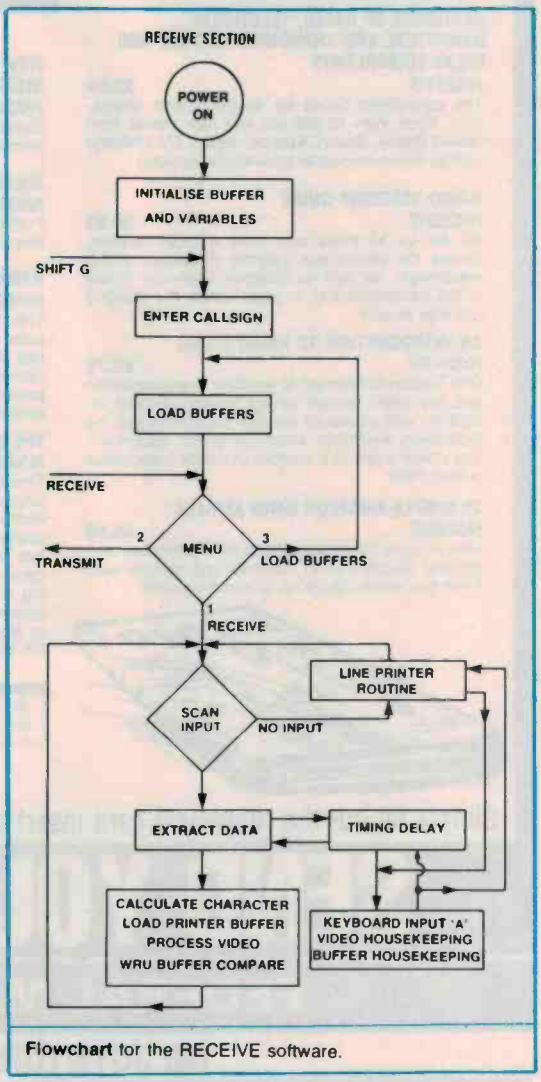
That concludes the main operation description. The rest will come with experience, as will normal RTTY operating procedures.

For further information on amateur RTTY, we suggest you contact *The Australian National Amateur Radio Teleprinter Society* at the following address:

The Secretary,
ANARTS,
PO Box 860,
Crows Nest NSW 2065



Flowchart for the TRANSMIT software.



Flowchart for the RECEIVE software.